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ABSTRACT

This guide is intended to assist people with physical disabilities who are wheelchair users and their families in the construction of a barrier-free home. Introductory information notes the importance of specific planning for individual needs and full participation by the homeowner as well as the architect and contractor. Briefly addressed are: preferred home designs, preferred lots and site locations, foundations (concrete slab or ramps), doorways, door hardware, closets, bathrooms, water controls, kitchens, flooring, electrical controls and outlets, and telephone jacks. Eleven questions that should be considered prior to design and construction are included. A listing of organizations involved with accessible housing research/design or accessible products is offered, as is a list of 18 recommended publications. (DB)

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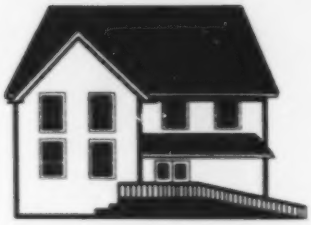
INFORMATION SUPPORT PACKET #3

A Barrier-Free Home



Considerations and recommendations for design

Prepared by
John H. Stevens

This guide is intended to assist persons with physical disabilities and their families who are thinking of constructing a barrier-free home. Since many people with severe physical limitations use a wheelchair at least some of the time, this guide is written primarily with these individuals in mind. However, it is important to remember that a barrier-free home not only maximizes a wheelchair user's independence, but non-disabled family members also discover unexpected benefits such as enhanced levels of safety or easier chores due to wider spaces.

It is very important to know exactly what your specific needs are and incorporate features to accommodate these needs during the planning stages. Specific planning with regard to the kitchen and bathroom are of the utmost importance, particularly for the wheelchair user. There are many ways to design a barrier-free home to be both functional and aesthetically pleasing. A person's home need not and should not take on a "clinical" or "hospital" appearance. It is wise for a future barrier-free homeowner to become actively involved in the planning and design of the home. However, if the person with a disability chooses to leave some or all of this to an architect, he or she should make certain that their architect understands the meaning of "barrier-free" from the disabled person's point of view. Try and find out if he has designed barrier-free homes for others and how well those people have enjoyed their homes.

Similar rules apply to the contractor. Make certain that he fully understands how and why your home has to be exactly suited to your needs. During the various stages of construction, keep informed as to how closely the construction is meeting the plans. If you are personally unable to enter the building due to debris or some other reason, have an ambulatory person do it for you, but tell the person specifically what things to check on.

For most people, both disabled and non-disabled, a home is the largest investment they will ever make. Since a great deal of the next 30 years or so will be spent living inside, a well designed barrier-free residence can be more than just a dream home. It will increase the level of self-esteem and personal independence that can be reached and enjoyed.

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Preferred Home Designs

When considering the design of a barrier-free home, keep in mind that a wheelchair user will need considerably more floor space in order to independently do many of the same tasks as ambulatory persons. Usually the person with a disability will need to make every square foot count. For example, many barrier-free homeowners often design their homes to eliminate or at least minimize lengthy hallways. Essentially, hallways serve no functional purpose, yet consume square footage that could be put to more efficient use. Also, two-story homes allow more square footage on a smaller lot, but expensive elevators or stair glides have to be installed to provide access to the second floor. Therefore, most people with physical disabilities have traditionally chosen the basic single-story ranch homes which permit faster and easier access to all rooms.

Split-level or tri-level floor plans also hamper fast and free maneuvering, even when decorative interior ramps are used. The compromise between beauty, design, and function should rest with the person who will have to live in and otherwise use the home.

Preferred Lots and Site Locations

When choosing the best site for an accessible home, keep in mind that a fairly level, but well drained lot is usually preferred. This is important to allow someone with mobility restrictions to fully utilize their home and property, both inside and outside the house. A building site that is free of slopes, hills, uneven terrain, and other obstacles will help to facilitate the full enjoyment of backyard barbecues, gardening, light yardwork and other hobbies or interests.

Foundations: Concrete Slab or Ramps

In order to maximize independence in entering and exiting the house, a wheelchair user will preferably need a house constructed on a concrete slab, thereby eliminating the need for steps, and thus ramping as well. This is highly preferred by the majority of wheelchair users, but should only be done on a lot that has been properly graded so that surface water drains well and does not stand near the foundation of the house. An alternative is to build the house with a conventional crawl space, but construct ramps at the main entrances and exits of the home. As a general rule, a ramp is constructed of either wood or concrete. If wood is used, the timber must be treated to prevent future decaying. Any ramp should be a minimum of 42 inches in width. The slope should provide a minimum of one foot of linear ramp for every one inch of height that must be reached. For example, if the floor/porch level is 20 inches above ground level, the ramp should be at least 20 feet long, excluding any turning platforms.

A ramp can be designed and built to turn at 90 degree angles if such a design makes the house more aesthetically pleasing or brings the construction into compliance with local codes. Also, at any point where a ramp enters the house or turns 90 degrees, a minimum of a 5 x 5 feet platform should be inserted to provide adequate turning space, as well as safety when opening and closing a door or descending the ramp. As an added

safety feature to both wheelchair users and ambulatory persons, a handrail on both sides of the ramp should be included. The handrail should be 30 to 32 inches high. For added safety in conjunction with the handrails, there should be vertical support pickets under the handrails every 12 to 14 inches, or a guard rail at least 3 inches high. These features will prevent the wheelchair from accidentally rolling off the surface of the ramp. Similar rails and/or guards should also be included at each turning platform.

If the ramp is painted to match the exterior trim of the house, a skid-resistant paint should be used on all surfaces where the wheelchair tires come into contact with the wood. If a concrete ramp is used, a slight "rough" or "brushed" finish is desirable to improve traction in slippery weather conditions. Wrought iron or 2 inch diameter piping may be used as handrails if desired, but in some cases may not be as visually appealing.

Doorways

Ideally, a barrier-free home with doors that are 3 feet wide will provide maximum convenience and accommodate most sizes and models of wheelchairs. If a narrower doorway (e.g., the standard 32 inch) is used, consideration should be given to the use of "offset hinges" to provide a full 32 inches of clear passage width. Also, in areas where traffic will be frequent from one room to another, (e.g., from den to kitchen, or kitchen to dining room), an extra wide passageway of 4 feet or more is strongly recommended. No door should be hung in these wider passageways in order to facilitate better wheelchair maneuvering and functional use. Another option with regard to doorways is to use sliding "pocket" doors. Pocket doors recess into the wall and therefore save valuable floor space needed for furniture placement, or wheelchair maneuvering. However, remember that sliding doors do not fully recess into the wall and thus may not permit a minimum passage clearance of 36 or 32 inches. Also, the individual needs to take into consideration the styles or designs of doors that will work best at which locations and still allow maximum physical independence.

Door Hardware

Lever-type door handles should be used in place of conventional round doorknobs. This allows anyone, and especially someone with limited hand function or disabilities such as arthritis, to open the door easier and with less gripping. To further eliminate fine grasping and finger dexterity, push-button locks should be used. On each side of the door, across from the lever-type handles, a medium size handle or "screen door" handle should be installed to allow the wheelchair user to conveniently close the door upon exiting the room. Brass or clear plastic kick plates will need to be installed at the base of the doors to help prevent the footrest assembly of the wheelchair from scratching or otherwise damaging the door. If a "peephole" is installed in a door for security purposes, it will need to be at a height that will accommodate the user.

Closets

Whenever possible, but certainly near the master bedroom, there should be a large "roll-in" closet with an overhead light. Any rods on which clothes will be hung should be no higher than 46 inches. This is a height preferred by many wheelchair users. However, it is becoming more common to see adjustable height rods to accommodate various types of disabilities and to enhance resale value. Storage shelves should also be within easy reach for a seated person, but these too can be designed with an adjustable feature. When doors are used, consider a bi-fold design to conserve wall space for furniture in the room or hallway outside the closet. Since most barrier-free homes will probably house non-disabled individuals as well, all closets need not be the large "roll-in" type, but nevertheless should be designed in such a way as to be easily used by the disabled person.

Bathrooms

The bathroom is one of the most important areas in a barrier-free home. The floor space required will depend on individual needs, but a minimum recommended space, before fixtures, is 10 x 10 feet. The lavatory must be designed so that a wheelchair user can freely roll up under it. The most popular design is to build a wall-hung countertop with a custom mount basin as close to the front as possible. The countertop should be no higher than 31 inches. Soap dishes, medicine cabinets, and toothbrush holders should be installed at both a location and height that is convenient and functional for the individual user. Electrical outlets and switches for vanity lights or suction fans should be within easy reach. If grab bars are needed, they should be installed by the commode at the height preferred by the individual. This will usually be 28 to 31 inches high. In new construction, the walls should be horizontally reinforced with 2 x 8's all around the locations where grab bars are likely to be installed to provide maximum anchorage and strength for the bars.

Many wheelchair users prefer a roll-in shower for both speed and convenience when bathing. If a roll-in shower is installed, the dimensions should be no less than 4 feet wide by 5 feet long. The floor of the shower will have to be gradually sloped away from the main bathroom floor and toward the drain in the shower floor to prevent water from over flowing into the bathroom. Consideration should be given to installing the shower arm somewhat lower than usual so that a seated person can easily adjust the direction and flow of the water. An alternative to lowering the shower arm is to use a hand-held shower. The bathroom floor should be ceramic or vinyl. Carpet and rugs should be avoided.

Water Controls

Single-lever controls are recommended for faucets in the bathroom, kitchen, utility rooms, or other areas where faucets will be located. For the shower and/or bathtub area, a control with the "scald-guard" feature or another adjustment to protect against accidental burns on limbs that are insensate is highly recommended. The height of water controls along the wall of the shower should not exceed 33 inches. Also, some consideration should be given to installing the control a few inches off center toward the entrance side of the tub or shower. This will allow the wheelchair user to more conveniently reach the control, start the water flowing, and adjust the water temperature prior to getting into the tub or shower. Several manufacturers can provide single-lever controls at comparable cost to conventional controls that have separate hot/cold handles. A commode should be selected that has the flush control on the front of the tank rather than on the side.

Kitchens

If the wheelchair user is going to be involved with food preparations, dishwashing, and so on, there should be some basic features built into the kitchen. Countertops should not be higher than 32 inches. Rather than installing a conventional range, a cook top with controls at the front should be mounted into the countertop. The area underneath should be open (roll-under) to permit a wheelchair to freely maneuver under the cooktop. Someone with weak or stiff fingers might find that push-button or slide lever controls are more convenient than round knobs that have to be gripped and rotated. The sink area should also be open underneath to allow a wheelchair user to roll under to wash dishes, reach the water controls and other objects on the countertop. Adjustable height shelving, slide out shelves, lazy susans, and other convenience items should be considered during the planning stages.

Electrical outlets for small appliances should be placed at the front of the counters or within the countertop itself, but certainly at locations that are convenient for the wheelchair user to reach. The cabinet hardware should include the large D-shaped handles for easy gripping and for functional use with reachers or other assistive equipment. Many people find that self-closing hinges are convenient as well. All passages in the kitchen, (e.g., between counters and islands or between appliances and furniture), must be a minimum of 5 feet to achieve good maneuverability.. All exposed drain pipes and hot/cold inlet pipes should be wrapped with foam or insulation to prevent limb burns, scratches, or bruises.

Flooring

A firm, level floor will provide easy maneuverability for wheelchair users and in particular, for those individuals who use manual wheelchairs. The most preferred floor types are vinyl coverings, hardwood flooring, or conventional tile flooring. If carpet is used, it should be the tightly woven, short pile carpeting with no foam layer underneath. Any seam binders and strips that connect different floors should be of a low profile design to enhance easy wheeling from room to room.

Electrical

Light switches should not be placed higher than 42 inches above the floor. This height is convenient for most wheelchair users, but is not too low for most non-disabled people. a person has difficulty using the conventional toggle-type switch, then wider rocker-type switches are available that can be activated with the palm, side of the hand, or even the elbow. Where table lamps are placed, a touch-on 3-way adapter can be added to assist those with limited finger dexterity. Electrical outlets should be located 18 to 24 inches above the floor. Thermostats should also be installed low enough for a seated person to see and easily operate. Under no circumstances should light switches and electrical outlets exceed 48 inches in height. The use of 2-way switches should be used wherever possible to allow the individual to switch lights on or off at more than one location within a room. The circuit breaker box should be placed at a location that is accessible to, and within easy reach of a wheelchair user. Individual breaker switches should be identified and clearly labeled.

Telephone Jacks

During the early stages of construction, consider having telephone jacks installed in every possible location where it is anticipated that a phone would be needed for convenience or practical reasons. It is easier, more attractive, and less costly to have jacks installed before the walls are finished and the basic wiring is enclosed. Any wall jacks that are installed should not exceed 48 inches above floor level. The preferred height is 38 to 45 inches above the floor. It is better to have more than enough jacks installed throughout the house even though a phone may not actually be used at every location.

Questions To Ask Yourself Prior To Design and Construction:

1. Is this likely to be my permanent home, or should I be concerned about resale value?

2. Is the future construction site a fairly level, well-drained lot?

3. Is it more feasible to construct the home with entrance ramps or build the home on a concrete slab? Consider zoning/building codes, drainage and size of the lot, individual aesthetic preferences, and individual physical ability.

4. What amount of floor space and/or other requirements will I need in the bathroom, such as a roll-in shower, special faucet controls, roll-under sink, commode arrangements, etc.?

5. How much turning space and minimum clearance width will I need in doorways and other areas of the home to accommodate my wheelchair or other mobility equipment?

6. How much cooking and food preparation will I be doing in the kitchen? Consider access to cabinets, positioning and arrangement of appliances, burners and controls, oven, sink design, maneuvering space for wheelchairs, etc.

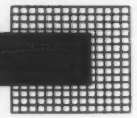
7. At what height will I need the light switches, thermostat, electrical outlets, and wall telephone jacks?

8. Will I need additional space to store a second wheelchair, adaptive aids, or other therapy or exercise equipment?

9. How much space or what type of arrangements will I need in the garage to enter and exit my vehicle?

10. What type of special arrangements and other space considerations will I need in the bedrooms? Consider space needed for transfers, access to furniture, closets, distance to bathrooms, etc.

NOTES



Some Helpful Publications

1. **The Accessible Housing Design File.** Available from: Van Nostrand Reinhold (Order Division), 7625 Empire Drive, Florence, KY 41042. (800) 926-2665. Cost: $42.95

2. **Adaptable Housing:** A Technical Manual for Implementing Adaptable Dwelling Unit Specifications. Available from: HUD USER, P.O. Box 6091, Rockville, MD 20850. (800) 245-2691. Cost: $3.00

3. **American National Standard for Buildings and Facilities-Providing Accessibility and Usability for Physically Handicapped People (ANSI A117.1-1986).** Available from: American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018. (212) 642-4900. Cost: $14.00

4. **Creation of the Barrier-Free Interior.** Available from: A Positive Approach, 1600 Malone Street, Municipal Airport, Millville, NJ 08332. (609) 451-4777. Cost: $15.00

5. **Directory of Accessible Building Products.** Available from: NAHB National Research Center, 400 Prince George's Boulevard, Upper Marlboro, MD 20772-8731. (301) 249-4000. Cost: $2.00 (postage/handling charge only)

6. **The Do-Able Renewable Home: Making Your Home Fit Your Needs.** Available from: AARP Fulfillment, P.O. Box 2240, Long Beach, CA 90801. (310) 427-9611. Cost: Free up to 10 copies

7. **Fair Housing Accessibility Guidelines-Final Design Guidelines for Accessible/Adaptable Dwellings, 56 Federal Register 9472-9515, March 6, 1991.** Available from: U. S. Department of Housing and Urban Development (HUD), Office of Fair Housing and Urban Development, Washington, DC 20410-0500. Cost: Free - single copy only. Multiple copies available from: Office of the Federal Register, National Archives and Records Administration, 1100 L Street, N.W., Washington, DC 20408. (202) 783-3238. Cost: $1.50 per copy

8. **The Housing Accessibility Information System (HAIS).** Available from: NAHB National Research Center, 400 Prince George's Boulevard, Upper Marlboro, MD 20722-8731. (301) 249-4000. Cost: $20.00 for hardcopy; $20.00 for software disk

9. **Ideas for Making Your Home Accessible.** Available from: Accent Press, P.O. Box 700, Bloomington, IL 61702. (309) 378-2961. Cost: $6.50

10. **Making Life More Livable:** Simple Adaptations for the Homes of the Blind and Visually Impaired Older People. Available from: American Foundation for the Blind, 15 West 16th Street, New York, NY 10011. (212) 620-2143. Cost $12.95 ($9.95 + $3.00 postage/handling)

11. **Model Barrier-Free Home.** Available from: S.C. Vocational Rehabilitation Department, 1410 Boston Ave., West Columbia, SC 29170. (803) 822-5313. Cost: Free

12. **National Directory of Home Modification and Repair Programs.** Available from: National Eldercare Institute on Housing and Supportive Services, Andrus Gerontology Center, University of Southern California, University Park MC-0191, Los Angeles, CA 90089-0191. (213) 740-1364. Cost: $8.00

13. **Residential Design for Retirement Living.** Available from: Drafts and Jumper Architects, P.A., 550 Meeting St., West Columbia, SC 29169. (803) 791-1020. Cost: $12.50

14. **Resource Guide on Accessory Units.** Available from: National Eldercare Institute on Housing and Supportive Services, Andrus Gerontology Center, University of Southern California, University Park MC-0191, Los Angeles, CA 90089-0191. (213) 740-1364. Cost: $12.00

15. **Resource Guide on Linking Housing and Services.** Available from: National Eldercare Institute on Housing and Supportive Services, Andrus Gerontology Center, University of Southern California, University Park MC-0191, Los Angeles, CA 90089-0191. (213) 740-1364. Cost: $10.00

16. **The Source Book:** Architectural Guidelines for Barrier-Free Design. Available from: The Barrier-Free Design Centre, 2075 Bayview Avenue, Toronto, Canada M4N 3M5. (416) 480-6000. Cost: $45.00 + $3.00 shipping

17. **Uniform Federal Accessibility Standards (UFAS).** Available from: U.S. Architectural and Transportation Barriers Compliance Board, 1111 18th Street, N.W., 5th Floor, Washington, DC 20036-3894. (202) 653-7834. Cost: Free-single copies

18. **Wheelchair House Designs.** Available from: Eastern Paralyzed Veteran's Association, 432 Park Avenue South, New York, NY 10016. (718) 803-3782. Cost: Free

Organizations Involved with Accessible Housing Research/Design or Accessible Products

Dr. Edward Steinfeld
Adaptive Environments Laboratory Products/Housing
Department of Architecture,
SUNY Buffalo
112 Hayes Hall
Buffalo, NY 14214
(716) 829-3861

American Association of Retired Persons (AARP)/ Housing
Consumer Affairs Division
601 E Street, NW
Washington, DC 20049
(202) 434-2277

Barrier Free Environments, Inc. Housing/Products
P.O. Box 30634
Raleigh, NC 27622
(919) 782-7823

Center for Accessible Housing, Research Housing/Products and Training
North Carolina State University
School of Design
Box 8613
Raleigh, NC 27695-8613
(919) 515-3082 (Voice/TDD)

Ms. Margaret Strassheim
Center for Therapeutic Applications of Technology Products
University of Buffalo -
515 Kimball Tower
3435 Main Street
Buffalo, NY 14214-3079
(800) 829-3141

Eastern Paralyzed Veterans Association/Housing
75-20 Astoria Boulevard
Jackson Heights, NY 11370-1178
(718) 803-EPVA

Electronic Industries Foundation, Inc./Products
919 18th Street, NW
Suite 909
Washington, DC 20006
(202) 955-5810

ProMatura Group-ITD
428 North Lamar Blvd.
Oxford, MS 38655
(601) 234-0158

Jay Klein
Institute on Disability/ Housing Options
University of New Hampshire
4 Hood House
Durham, NH 03824
(603) 862-4190

National Association of Home Builders Housing/Products National Research Center
400 Prince Georges Boulevard
Upper Marlboro, MD 20772-8731
(301) 249-4000
(800) 638-8556

National Easter Seal Society Housing
230 West Monroe Street
Suite 1800
Chicago, IL 60606-4802

National Eldercare Institute on Housing and Supportive Services
Andrus Gerontology Center
University of Southern California -
University Park, MC 0191
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